IN THE CLAIMS

1. (Currently Amended) A force sensor ~~(200)~~ fabricated in a micro machined process, for use in for instance a nanoindentation setup, wherein said force sensor ~~(200)~~ comprise:
   - a membrane ~~(207)~~ movable in relation to a bulk structure;
   - at least one detection element ~~(206)~~ in a detection structure ~~(206)~~ in connection with a bulk structure ~~(210)~~;
   - connectors ~~(208)~~ for connecting said force sensor to electronics;

   ~~characterized in that~~ wherein said membrane ~~(207)~~ is attached to said bulk structure ~~(210)~~ through at least one spring ~~(201, 202, 203, 204)~~ and that said membrane ~~(207)~~ include a probe holding structure ~~(214)~~, said at least one spring ~~(201, 202, 203, 204)~~ provide said membrane ~~(207)~~ with movement capabilities for said membrane ~~(207)~~ in at least one direction with respect to said bulk structure ~~(210)~~; said movement is measured using said at least one detection element ~~(206)~~.

2. (Currently Amended) The force sensor ~~(200)~~ according to claim 1, wherein said detection structure ~~(206)~~ comprise at least three detection elements; providing both lateral and horizontal sensitivity.

3. (Currently Amended) The force sensor ~~(200)~~ according to claim 1, wherein a force acting on a probe ~~(211)~~ attached to said probe holding structure ~~(214)~~ is measured by detecting capacitive changes between said membrane ~~(207)~~ and said detection element ~~(206)~~.

4. (Currently Amended) The force sensor ~~(200)~~ according to claim 1, wherein a force acting on a probe ~~(211)~~ attached to said probe holding structure ~~(214)~~ is measured by detecting a piezoelectric effect in a detection element ~~(201, 202, 203, 204)~~.

5. (Currently Amended) The force sensor ~~(200)~~ according to claim 1, wherein said membrane ~~(207)~~ has a rectangular shape as seen from a view perpendicular to a plane parallel to said detection element ~~(206)~~.

6. (Currently Amended) The force sensor ~~(200)~~ according to claim 1, wherein said membrane ~~(207)~~ is attached to said bulk structure ~~(210)~~ with eight springs ~~(201, 202, 203, 204)~~.

7. (Currently Amended) The force sensor ~~(200)~~ according to claim 6, wherein said springs ~~(201, 202, 203, 204)~~ are located two on each side of said membrane ~~(207)~~ as seen from a view perpendicular to a plane parallel to said detection element ~~(206)~~; said two springs ~~(201, 202, 203, 204)~~ are located in a mirror like formation providing symmetric movement.

8. (Currently Amended) The force sensor ~~(200)~~ according to claim 1, wherein said at least one spring ~~(800)~~ comprise a U-shaped form with heels ~~(801)~~ protruding at two respective open ends in order to space said U-shaped form away from said membrane ~~(805)~~ and said bulk structure ~~(804)~~.

9. (Currently Amended) The force sensor ~~(200)~~ according to claim 1, wherein said probe holding structure ~~(214)~~ is formed with a recessed open end relative said bulk structure ~~(210)~~.

10. (Currently Amended) A nanoindentation system ~~(300)~~ for use in a transmission electron microscope ~~(101)~~, comprising
    - a force sensor ~~(200, 306)~~ comprising:
        a. a membrane ~~(207)~~ movable in relation to a bulk structure;
        b. at least one detection element ~~(206)~~ in a detection structure ~~(206)~~ in connection with a bulk structure ~~(210)~~;
        c. connectors ~~(208)~~ for connecting said force sensor to electronics;

    wherein said membrane ~~(207)~~ is attached to said bulk structure ~~(210)~~ through at

least one spring ~~(201, 202, 203, 204)~~ and that said membrane ~~(207)~~ include a probe holding structure ~~(214)~~, said at least one spring ~~(201, 202, 203, 204)~~ provide said membrane ~~(207)~~ with movement capabilities for said membrane ~~(207)~~ in at least one direction with respect to said bulk structure ~~(210)~~; said movement is measured using said at least one detection element ~~(206)~~;

- a nanoindentation probe ~~(211, 305)~~ mounted on said force sensor ~~(200, 306)~~;
- a displacement device ~~(302, 303)~~; and
- a sample holding structure ~~(304)~~;

wherein said force sensor ~~(200, 306)~~, nanoindentation probe ~~(211, 305)~~, displacement device ~~(302, 303)~~, and sample holding structure ~~(304)~~ are mounted on a transmission electron microscopy (TEM) sample holder ~~(104)~~, said sample holding structure ~~(304)~~ and nanoindentation probe ~~(211, 305)~~ are movable in relation to each other.

11. (Currently Amended) The nanoindentation system ~~(300)~~ according to claim 10, wherein said displacement device is an inertial motor;

12. (Currently Amended) A method for producing a force sensor ~~(200)~~, using a substrate with a buried oxide layer, comprising the basic steps of:
    - etching a cavity on a first side of said substrate;
    - providing on said first side of said substrate with an oxide mask;
    - p++ doping on a second side of said substrate;
    - patterning said second side of said substrate using double-sided lithography and etching down said second side of said substrate to said buried oxide layer;
    - providing an enhanced oxide mask on said first said of said substrate and etching springs;
    - deep dry etching of said first side of said substrate to obtain a probe holding structure ~~(214)~~; and
    - bonding said sensor chip anodically with a glass substrate comprising connectors ~~(208)~~.

13. (Currently Amended) The method according to claim 12, wherein a plurality of said force sensor ~~(200)~~ are produced on wafer.

14. (Currently Amended) A nanoindentation sample ~~(700)~~ for use in a nanoindentation system ~~(300)~~, comprising

- a base plate ~~(701)~~ providing mounting areas ~~(706)~~; and
- a ridge ~~(703)~~ located essentially centered and integrally formed on said base plate; ~~characterized in that~~ wherein said ridge ~~(703)~~ extends along said base plate ~~(701)~~ with a wide base at said base plate ~~(701)~~ and a sharp edge ~~(702)~~ protruding away from said base plate ~~(701)~~; a curve form of said ridge as seen from a side view has a more steep narrowing towards said edge ~~(702)~~ than linear.

15. (Currently Amended) The nanoindentation sample ~~(700)~~ according to claim 14, further comprising a hole or intrusion ~~(705)~~ on a back side of said sample ~~(700)~~ in order to facilitate mounting of said sample ~~(700)~~ on a sample holder ~~(309)~~.